

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. An identifier indicating the status of each claim is provided.

Listing of Claims

1. (Currently Amended) An image-signal processing apparatus for processing an input image signal at a position of each pixel, said input image signal of each pixel having only one of various color components, said apparatus comprising:

defect-correcting means for correcting defective pixels in the input image signal;

clamping means for clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

white-balancing means for white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

extraction means for extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of each pixel of interest ~~and in accordance with the color component of the plurality of pixels to be extracted;~~

class-determining means for determining a class from the pixels extracted by the extraction means; and

pixel-generating means for generating ~~a pixel at a position of more than one color components~~ for the pixel of interest in accordance with the class-determining means, ~~said pixel having all color components.~~

~~wherein the plurality of pixels extracted by the extraction means and used by the class-determining means include at least one pixel that is not adjacent to the pixel of~~

interest wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest.

2. (Canceled)

3. (Previously Presented) The image-signal processing apparatus according to claim 1,

wherein the pixel-generating means comprises:

storage means for storing a set of prediction coefficients for each class; and

operation means for performing an operation on a set of prediction coefficients

which corresponds to the class determined by the class-determining means and the pixels located near the pixel of interest which have been extracted by the extraction means, thereby to generate a pixel having a color component different from at least the color component of the pixel of interest.

4. (Previously Presented) The image-signal processing apparatus according to claim 3,

wherein the operation means performs an operation on a linear combination of the set of prediction coefficients and the values of the pixels located near the pixel of interest.

5. (Previously Presented) The image-signal processing apparatus according to claim 3,

wherein the extraction means extracts at least one different pixel and supplies the same to the class-determining means and the operation means.

6. (Previously Presented) The image-signal processing apparatus according to claim 1,

wherein the color component represents a color of red, blue or green.

7. (Previously Presented) The image-signal processing apparatus according to claim 1, further comprising acquisition means for acquiring an image signal having a pixel at each pixel position, said pixel having one of various color components.

8. (Previously Presented) The image-signal processing apparatus according to claim 7,

wherein the acquisition means is a solid-state imaging element.

9. (Previously Presented) The image-signal processing apparatus according to claim 8,

wherein the solid-state imaging element is a CCD image sensor of the Bayer arrangement.

10. (Currently Amended) An image-signal processing method of processing an input image signal at a position of a pixel, said input image signal of each pixel having only one of various color components, said method comprising:

a defect-correcting step of correcting defective pixels in the input image signal;

a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

an extraction step of extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of each pixel of interest ~~and in accordance with the color component of the plurality of pixels to be extracted;~~

a class-determining step of determining a class from the pixels extracted in the extraction step; and

a pixel-generating step of generating ~~a pixel at a position of~~ more than one color components for the pixel of interest in accordance with the class determined in the class-determining step, said pixel having all color components ,

wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest ~~wherein the plurality of pixels extracted in the extraction step and used in the class determining step include at least one pixel that is not adjacent to the pixel of interest.~~

11. (Canceled)

12. (Previously Presented) The image-signal processing method according to claim 10,

wherein in the pixel-generating step, operation means performs an operation on a set of prediction coefficients which corresponds to the class determined in the class-determining step and the pixels located near the pixel of interest which have been extracted in the extraction step, thereby to generate a pixel having the different color component.

13. (Previously Presented) The image-signal processing method according to claim 12,

wherein in the pixel-generating step, an operation is performed on a linear combination of the set of prediction coefficients and the values of the pixels located near the pixel of interest.

14. (Previously Presented) The image-signal processing method according to claim 12,

wherein in the extracting step, at least one different pixel is extracted for use in the class-determining step and the pixel-generating step.

15. (Previously Presented) The image-signal processing method according to claim 10,

wherein the color component represents a color of red, blue or green.

16. (Previously Presented) The image-signal processing method according to claim 10, further comprising an acquisition step of acquiring an image signal having a pixel at each pixel position, said pixel having one of various color components.

17. (Previously Presented) The image-signal processing method according to claim 16,
wherein in the acquisition step, a solid-state imaging element acquires the image signal.

18. (Previously Presented) The image-signal processing method according to claim 17,
wherein in the acquisition step, a CCD image sensor of the Bayer arrangement acquires the image signal.

19. (Currently Amended) A recording medium storing a computer program designed to process an input image signal at a position of a pixel, said input image signal of each pixel having only one of various color components, said computer program comprising:
a defect-correcting step of correcting defective pixels in the input image signal;
a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;
a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

an extraction step of extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of each pixel of interest ~~and in accordance with the color component of the plurality of pixels to be extracted;~~

a class-determining step of determining a class from the pixels extracted in the extraction step; and

a pixel-generating step of generating ~~a pixel at a position of more than one color components~~ for the pixel of interest in accordance with the class determined in the class-determining step, said pixel having all color components;

~~wherein the plurality of pixels extracted in the extraction step and used in the class-determining step include at least one pixel that is not adjacent to the pixel of interest~~
wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest.

20. (Canceled)

21. (Previously Presented) The recording medium according to claim 19,

wherein in the pixel-generating step, operation means performs an operation on a set of prediction coefficients which corresponds to the class determined in the class-determining step and the pixels located near the pixel of interest which have been extracted in the extraction step, thereby to generate a pixel having the different color component.

22. (Previously Presented) The recording medium according to claim 21, wherein in the pixel-generating step, an operation is performed on a linear combination of the set of prediction coefficients and the values of the pixels located near the pixel of interest.

23. (Previously Presented) The recording medium according to claim 21, wherein in the extraction step, at least one different pixel is extracted for use in the class-determining step and the pixel-generating step.

24. (Previously Presented) The recording medium according to claim 19, wherein the color component represents a color of red, blue or green.

25. (Previously Presented) The recording medium according to claim 19, wherein the computer program further comprises an acquisition step of acquiring an image signal having a pixel at each pixel position, said pixel having one of various color components.

26. (Previously Presented) The recording medium according to claim 25, wherein in the acquisition step, a solid-state imaging element acquires the image signal.

27. (Previously Presented) The recording medium according to claim 26,
wherein in the acquisition step, a CCD image sensor of the Bayer arrangement
acquires the image signal.

28-36. (Canceled)

37. (Currently Amended) An image-signal processing apparatus for
processing an input image signal, said input image signal having a prescribed number of sample
values which constitute one image and each of which represents only one of various colors at
each pixel, said apparatus comprising:

defect-correcting means for correcting defective pixels in the input image signal;

clamping means for clamping the input image signal to eliminate shifted
components of the defect-corrected image signal;

white-balancing means for white-balancing the input image signal to correct the
gain of the clamped image signal supplied from the clamping means;

extraction means for extracting a plurality of pixels located near each pixel of
interest of the white-balanced image signal in accordance with the color component of the pixel
of interest;

class-determining means for determining a class from the pixels extracted by the
extraction means; and

output image-signal generating means for generating an output image signal
having more sample values than the prescribed number, for the various colors each having more
than one color components, by processing each pixel of the input image signal in accordance

with the class determined by the class-determining means and in accordance with a relative position of added samples to a corresponding sample in the input image signal,

~~wherein the plurality of pixels extracted by the extraction means and used by the class-determining means include at least one pixel that is not adjacent to the pixel of interest~~
wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest.

38. (Previously Presented) The image-signal processing apparatus according to claim 37,

wherein the output image-signal generating means comprises:

storage means for storing a set of prediction coefficients for each class; and

operation means for performing an operation on a set of prediction coefficients

which corresponds to the class determined by the class-determining means and the pixels located near the pixel of interest which have been extracted by the extraction means, thereby to generate the output image signal.

39. (Currently Amended) An image-signal processing method of processing an input image signal, said input image signal having a prescribed number of sample values which constitute one image and each of which represents only one of various colors, said method comprising:

a defect-correcting step of correcting defective pixels in the input image signal;

a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

an extraction step of extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest;

a class-determining step of determining a class from the pixels extracted in the extraction step; and

an output image-signal generating step of generating an output image signal having more sample values than the prescribed number, for the various colors each having more than one color components, by processing each pixel of the input image signal in accordance with the class determined in the class-determining step and in accordance with a relative position of added samples to a corresponding sample in the input image signal,

~~wherein the plurality of pixels extracted in the extraction step and used in the class determining step include at least one pixel that is not adjacent to the pixel of interest~~ wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest.

40. (Previously Presented) The image-signal processing method according to claim 39,

wherein in the output image-signal generating step, an operation is performed on a set of prediction coefficients which corresponds to the class determined in the class-determining step and the pixels located near the pixel of interest which have been extracted in the extraction step, thereby to generate the output image signal.

41. (Currently Amended) A recording medium storing a computer program designed to process an input image signal, said input image signal having a prescribed number of sample values which constitute one image and each of which represents only one of various colors, said computer program comprising:

a defect-correcting step of correcting defective pixels in the input image signal;
a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

an extraction step of extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest;

a class-determining step of determining a class from the pixels extracted in the extraction step; and

an output image-signal generating step of generating an output image signal having more sample values than the prescribed number, for the various color each having more

than one color components, by processing each pixel of the input image signal in accordance with the class determined in the class-determining step and in accordance with a relative position of added samples to a corresponding sample in the input image signal,

wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest~~wherein the plurality of pixels extracted in the extraction step and used in the class-determining step include at least one pixel that is not adjacent to the pixel of interest.~~

42. (Previously Presented) The recording medium according to claim 41, wherein in the output image-signal generating step, an operation is performed on a set of prediction coefficients which corresponds to the class determined in the class-determining step and the pixels located near the pixel of interest which have been extracted in the extraction step, thereby to generate the output image signal.

43-48. (Canceled)

49. (Currently Amended) An image-signal processing apparatus for processing an input image signal at a position of each pixel, said input image signal of each pixel having only one of various color components, said apparatus comprising:

defect-correcting means for correcting defective pixels in the input image signal;

clamping means for clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

white-balancing means for white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

extraction means for extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest, each pixel of the extracted plurality of pixels having a color component of the highest density of all color components;

class-determining means for determining a class from the pixels extracted by the extraction means; and

pixel-generating means for generating ~~a pixel~~more than one color components for the pixel of interest in accordance with the class determined by the class-determining means, ~~said pixel having all color components~~;

wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest~~wherein the plurality of pixels extracted by the extraction means and used by the class determining means include at least one pixel that is not adjacent to the pixel of interest.~~

50. (Previously Presented) The image-signal processing apparatus according to claim 49,

wherein the pixel-generating means comprises:

storage means for storing a set of prediction coefficients for each class; and

operation means for performing an operation on a set of prediction coefficients

which corresponds to the class determined by the class-determining means and the pixels located

near the pixel of interest which have been extracted by the extraction means, thereby to generate the pixel having the different color component.

51. (Previously Presented) The image-signal processing apparatus according to claim 49,

wherein the pixel-generating means generates a pixel having all color components at the position of the pixel of interest.

52. (Currently Amended) An image-signal processing method of processing an input image signal at a position of each pixel, said input image signal of each pixel having only one of various color components, said method comprising:

a defect-correcting step of correcting defective pixels in the input image signal;

a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

an extraction step of extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest, each pixel of the extracted plurality of pixels having a color component of the highest density of all color components;

a class-determining step of determining a class from the pixels extracted in the extraction step; and

a pixel-generating step of generating more than one color components for the pixel of interest a pixel in accordance with the class determined in the class-determining step, said pixel having all color components;

wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest ~~wherein the plurality of pixels extracted in the extraction step and used in the class-determining step include at least one pixel that is not adjacent to the pixel of interest.~~

53. (Previously Presented) The image-signal processing method according to claim 52,

wherein in the pixel-generating step, an operation is performed on a set of prediction coefficients which corresponds to the class determined in the class-determining step and the pixels located near the pixel of interest which have been extracted in the extraction step, thereby to generate the pixel having the different color component.

54. (Previously Presented) The image-signal processing apparatus according to claim 52,

wherein in the pixel-generating step, a pixel having all color components is generated at the position of the pixel of interest.

55. (Currently Amended) A recording medium storing a computer program designed to process an input image signal at a position of each pixel, said input image signal of each pixel having only one of various color components, said computer program comprising:

- a defect-correcting step of correcting defective pixels in the input image signal;
- a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;
- a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;
- an extraction step of extracting a plurality of pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest, each pixel of the extracted plurality of pixels having a color component of the highest density of all color components;
- a class-determining step of determining a class from the pixels extracted in the extraction step; and
- a pixel-generating step of generating more than one color components for the pixel of interest~~a pixel~~ in accordance with the class determined in the class-determining step, ~~said pixel having all color components.~~

wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest~~wherein the plurality of pixels extracted in the extraction step and used in the class determining step include at least one pixel that is not adjacent to the pixel of interest.~~

56. (Previously Presented) The recording medium according to claim 55, wherein in the pixel-generating step, an operation is performed on a set of prediction coefficients which corresponds to the class determined in the class-determining step and the pixels located near the pixel of interest which have been extracted in the extraction step, thereby to generate the pixel having the different color component.

57. (Previously Presented) The recording medium according to claim 55, wherein in the pixel-generating step, a pixel having all color components is generated at the position of the pixel of interest.

58-63. (Canceled)

64. (Currently Amended) An image-signal processing apparatus for processing an input image signal at a position of each pixel, said input image signal of each pixel having only one of various color components, said apparatus comprising:

defect-correcting means for correcting defective pixels in the input image signal;

clamping means for clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

white-balancing means for white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

extraction means for extracting a plurality of pixels for each color component, from pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest;

class-determining means including a characteristic-data generating section for generating characteristic data about the pixels of each color component, from the pixels of each color component which have been extracted by the extraction means, and a class-determining section for determining a class from the characteristic data generated for each color component; and

pixel-generating means for generating more than one color components for the pixel of interest—~~pixel~~ in accordance with the class determined by the class-determining means, ~~said pixel having all color components;~~

~~wherein the plurality of pixels extracted by the extraction means and used by the class-determining means include at least one pixel that is not adjacent to the pixel of interest~~wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest.

65. (Previously Presented) The image-signal processing apparatus according to claim 64,

wherein the characteristic-data generating section generates, as the characteristic data, a space activity of the pixels of each color component, which have been extracted by the extraction means.

66. (Previously Presented) The image-signal processing apparatus according to claim 65,

wherein the characteristic-data generating section generates the space activity by performing of ADRC (Adaptive Dynamic Range Coding) process on the pixels of each color component.

67. (Previously Presented) The image-signal processing apparatus according to claim 64,

wherein the extraction means extracts the pixels corresponding to each color component from pixels existing in a region near the pixel of interest.

68. (Currently Amended) An image-signal processing method of processing an input image signal at a position of each pixel, said input image signal of each pixel having only one of various color components, said method comprising:

a defect-correcting step of correcting defective pixels in the input image signal;

a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

an extraction step of extracting a plurality of pixels for each color component, from pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest;

a class-determining step of generating characteristic data about the pixels of each color component, from the pixels of each color component which have been extracted in the extraction step and determining a class from the characteristic data generated for each color component; and

a pixel-generating step of generating more than one color components for the pixel of interest a pixel in accordance with the class determined in the class-determining step, said pixel having all color components;

wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest wherein the plurality of pixels extracted in the extraction step and used in the class determining step include at least one pixel that is not adjacent to the pixel of interest.

69. (Previously Presented) The image-signal processing method according to claim 68,

wherein in the characteristic-data generating step, a space activity of the pixels of each color component, which have been extracted in the extraction step, is generated as the characteristic data.

70. (Previously Presented) The image-signal processing method according to claim 69,

wherein in the class-determining step, the space activity is generated by performing of ADRC (Adaptive Dynamic Range Coding) process on the pixels of each color component.

71. (Previously Presented) The image-signal processing method according to claim 68,

wherein the pixels corresponding to each color component from pixels existing in a region near the pixel of interest are extracted in the extraction step.

72. (Currently Amended) A recording medium storing a computer program designed to process an input image signal at a position of each pixel, said input image signal of each pixel having only one of various color components, said computer program comprising:

a defect-correcting step of correcting defective pixels in the input image signal;
a clamping step of clamping the input image signal to eliminate shifted components of the defect-corrected image signal;

a white-balancing step of white-balancing the input image signal to correct the gain of the clamped image signal supplied from the clamping means;

an extraction step of extracting a plurality of pixels for each color component, from pixels located near each pixel of interest of the white-balanced image signal in accordance with the color component of the pixel of interest;

a class-determining step of generating characteristic data about the pixels of each color component, from the pixels of each color component which have been extracted in the extraction step and determining a class from the characteristic data generated for each color component; and

a pixel-generating step of generating more than one color components for the pixel of interest in accordance with the class determined in the class-determining step, ~~said pixel having all color components;~~

wherein the more than one color components include one color component that is the same as that of the input signal of the pixel of interest and a color component that is different from that of the input signal of the pixel of interest ~~wherein the plurality of pixels extracted in the extraction step and used in the class determining step include at least one pixel that is not adjacent to the pixel of interest.~~

73. (Previously Presented) The recording medium according to claim 72, wherein in the characteristic-data generating step, a space activity of the pixels of each color component, which have been extracted in the extraction step, is generated as the characteristic data.

74. (Previously Presented) The recording medium according to claim 73, wherein in the class-determining step, the space activity is generated by performing of ADRC (Adaptive Dynamic Range Coding) process on the pixels of each color component.

75. (Previously Presented) The recording medium according to claim 72,
wherein the pixels corresponding to each color component from pixels existing in
a region near the pixel of interest are extracted in the extraction step.

76-84. (Canceled)

85. (New) An image-signal processing apparatus for processing an input
image signal having more than one color components, each pixel of the input image signal
having one color component, said apparatus comprising:

defect-correcting means for correcting defective pixels in the input image signal;

clamping means for clamping the input image signal to eliminate shifted
components of the defect-corrected image signal;

white-balancing means for white-balancing the input image signal to correct the
gain of the clamped image signal supplied from the clamping means;

extraction means for extracting a plurality of pixels located near each pixel of
interest of the white-balanced image signal in accordance with the color component of each pixel
of interest;

class-determining means for determining a class from the pixels extracted by the
extraction means;

storing means for storing a set of prediction coefficients for each class and each
color component; and

pixel-generating means for generating a color component at a position of the pixel of interests by using said plurality of pixels extracted by said extraction means and prediction coefficients,

wherein the prediction coefficients are selected corresponding to the class determined by the class-determining means and the color component to be generated.